NPC
North Peak Consulting

RESIDENTIAL WELL TEST

TPM 20930

Parcel No: 288-081-06
Ramona, California

Prepared for:

Mr. William Skanes
15510 Rainbird Rd.
Ramona, CA 92036

Prepared by:

North Peak Consulting

August 21, 2006

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August 21, 2006

William Skanes
15510 Rainbird Rd.
Ramona, CA 92065

Subject: Well Test Report for Skanes Tentative Parcel Map TPM 20930

Dear Mr. and Mrs. Skanes,

In accordance with your request, we have prepared this well test report for the subject property located in the community of Ramona, San Diego County, APN 288-081-06.

If you have any questions or comments regarding this report, please contact either of the undersigned. North Peak Consulting appreciates this opportunity to be of service.

Sincerely,

NORTH PEAK CONSULTING

Laura Maghsoudlou
Geologist

Mehrzad Maghsoudlou, P.G. 8001
Supervising Geologist

1. INTRODUCTION AND SCOPE OF SERVICES

This evaluation addresses the well testing requirements as set forth within the County's Groundwater Ordinance, Ordinance No. 9664, Section 67.722.C. The project proposes a subdivision of 16.44 acres of land into 3 parcels ranging from 5.05 to 6.11 gross acres within the unincorporated community of Ramona, County of San Diego, APN 288-081-06 (Figure 1).

The scope of services included the following:

- Site reconnaissance
- Well production and recovering testing of the existing production well
- Obtaining three water samples for nitrate and bacteria testing
- Preparation of this report

2. WELL TEST

A constant-rate discharge well test was performed on August 7, 2005, as requested by the County within the project scoping letter dated May 10, 2005, Attachment D (Appendix A). The test was carried out on the existing residential well located on Parcel 2 of the proposed parcel map (Figures 2 and 3). An average flowrate of 10 gpm was maintained throughout the test. The flowrate used was a conservative rate by request of the applicant to ensure adequate water supply in the unlikely case of a shared well system. At this time, individual wells are proposed.

In preparation of the test, a sounding tube was installed in the well so that measurements could be made without interference from the well's plumbing and electrical system. Additionally, the well was not pumped for 36 hours prior to the testing. Water levels were measured with an electric water level meter and discharge was measured with an in-line flowmeter. The discharged water was directed 100 feet downgradient of the well.

The borehole volume for the well at the time of the test was 203.4 gallons. This number was calculated by using the information provided by the well pump installer that was onsite prior to performing the well test. The well's original pump system was failing and in the process of

pulling out the old pump system and piping, it was determined that the depth of the well was approximately 400'. A new submersible pump system was installed at 366' (Appendix B). The land owner, Mr. Skanes, was unable to obtain a copy of the well log from the County Department of Environmental Health. It is assumed that the original driller did not submit the proper forms after the drilling and construction of the well.

Therefore, in order to meet County Standards of producing a minimum of two borehole volumes during the well test, 406.8 gallons needed to be pumped. For this well, the minimum test duration of three hours and flow rate of 10 gallons per minute resulted in the production of 1,800 gallons.

The initial (assumed static) water level was 261.5 feet bgs. At the end of 3 hours of constant discharge, the water level dropped by 4.9 feet to 266.4 feet bgs (Table 1 and Figure 4). Wellbore storage effects were addressed by determining the specific capacity of the well after the completion of 3 hours of pumping. The specific capacity was calculated by the following equation:

$$\textbf{\textit{Specific Capacity}} = \frac{Q}{h - h_o}$$

Where:

Q = Discharge rate (gallons/minute)

h = Initial water level (ft bgs)

h_o = Water level at 3 hours of pumping (ft bgs)

Based on this equation, the specific capacity value for the well was 2.04 gpm/ft (10 gpm/4.9 ft). Thus, an increase in the pumping duration was not warranted and the well was shut off to start monitoring the rate of recovery. Within 75 minutes, the 4.9 feet of drawdown recovered by 4.6 feet (94%). The County's Groundwater Ordinance Section 67.703 requires that 90% of total drawdown be recovered within 12 hours of termination of the well test. Therefore, the recovery monitoring concluded after 75 minutes.

3. WATER QUALITY

As required from the County Scoping Letter (Appendix A), three water samples were obtained. Samples #2 and #3 were collected two hours into the well test and immediately prior to completion of the test. At 1:30 p.m. and 2:30 p.m., respectively. Due to the processing time constraints with the County's Environmental Health Laboratory, Sample #1 was collected at 7:00 a.m. the following morning immediately prior to the delivery to the County's Department of Environmental Health, El Cajon. The well was completely shut down after the recovery period and not pumped until the time of collection. This course of action was taken in order to best model the conditions of the groundwater system as they were the previous day before the start of the well test. As noted in the above section, the well is used daily as the potable water source for the residence.

The initial nitrate testing was carries out by the Department of Environmental Health (DEH) and then the samples were transferred by DEH to the Public Health Laboratory in San Diego for the coliform bacteria testing. Due to a miscommunication with DEH, the Environmental Health Specialist only performed the Nitrate testing on one of the three samples. The County's Public Health Laboratory carried out the coliform bacteria testing for all three samples. Although the results met water quality standards for nitrates and coliform bacteria (Appendix C), Mr. Jim Bennett of the County Planning and Land Use requested a new round of nitrate sampling.

Additional sampling took place on April 26, 2006. The first sample was taken from the well before any pumping had begun. The well was then pumped at a constant rate of 3 gpm for three hours. The second and third samples were taken at hours two and three, respectively. The samples were transported by North Peak Consulting to a private San Diego laboratory, EnviroMatrix Analytical for chemical analysis. The results showed that the nitrate levels were within acceptable standards and are included with Appendix D.

4. CONCLUSION

This report concludes that the residential well test carried out for the proposed parcel map, TPM 20930rpl meets the requirements set forth with the County's Groundwater Ordinance (Ordinance No. 9644) and the County Standards for Groundwater Investigations. The calculated specific capacity after 3 hour s of pumping at 10 gpm was 2.04 gpm/ft (County Standards for a 3 hour pump test is .5 gpm/ft). Drawdown of the static water level was 4.9 feet and recovered 94% (4.6 feet) within 75 minutes after pumping was stopped, therefore meeting the Ordinance's 90% recovery standards. Water quality testing results for Nitrate levels and Coliform bacteria met both State and County standards for potable water.

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TABLE 1 FIELD DATA FOR SKANES WELL TEST

	Time (min)	Water Level (ft)	Cumulative Drawdown (ft)	GPM Discharge	Specific Capacity (gpm/ft)	% Recovery
Well-Test	0.0	261.5	0.0			
	1.0	263.4	1.9	9.9		
	3.0	264.7	3.2			
	5.0	265.0	3.5			
	10.0	265.3	3.8	10.2		
	15.0	265.7	4.2			
	25.0	265.8	4.3	9.7		
	35.0	265.9	4.4			
	45.0	265.9	4.4	10.1		
	55.0	266.0	4.5			
	80.0	266.2	4.7	10.0		
	110.0	266.4	4.9			
	115.0	266.4	4.9	10.1		
Water Sample #2	120.0	266.4	4.9			
	130.0	266.4	4.9			
	140.0	266.4	4.9	10.3		
	150.0	266.4	4.9			
	160.0	266.4	4.9			
	170.0	266.4	4.9	9.8		
Water Sample #3	180.0	266.4	4.9		**2.04**	
Recovery	190.0	264.0	2.4			49%
	210.0	263.0	3.4			69%
	230.0	262.3	4.1			84%
	255.0	261.8	4.6			94%

*Note: Refer to Section 3.0 for explanation regarding the collection of Water Sample #1

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5.0 REFERENCES

County of San Diego, 2004, San Diego County Groundwater Ordinance Number 9664

County of San Diego, 1991, County Standards for Site Specific Hydrogeologic Investigations

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